Applicant No.: 10/776,176
Reply to Office action of Oct. 5, 2006

Amendments to the Claims :

Please replace claims **1, 2 ,3 ,4 ,5 ,6 ,7 ,8 ,9 ,10 ,11 ,12 ,14 ,15 ,16 ,17 ,18 ,19 ,20** with the following amended claims:

1. (Currently amended) An apparatus for separating, a particle stream into particle groups, said apparatus being connectable to a positive pressure source, comprising:

a generally parallelepipedic dilution treatment chamber defining an upstanding passageway ~~channel~~ having a particle inlet at a top end, and a passageway outlet for the first-particle group outlet at a bottom end, ~~the~~ said passageway ~~channel~~ being adapted to receive a particle stream at ~~the~~ said particle inlet such that the particle stream falls toward ~~the~~ said passageway and first-particle-group outlet;

a generally parallelepipedic transfer chamber casing adjacent to the dilution treatment chamber and sharing a wall between said dilution treatment chamber and said transfer chamber, which is ~~and defining a transfer chamber~~ adapted to receive a second particle group.

at least one transfer aperture ~~second particle group outlet~~ substantially laterally positioned with respect to the said passageway ~~channel~~ of ~~the~~ said dilution treatment chamber, said transfer aperture extending between said transfer chamber and said passageway and allowing fluid flow jet communication between ~~the~~ said transfer chamber and ~~the~~ said passageway of said dilution treatment chamber ~~channel~~;

a distributor, nozzle located in ~~the~~ said passageway ~~channel~~ between ~~the~~ said particle inlet and ~~the~~ said transfer aperture and ~~the~~ at least one particle-group outlet, for substantially distributing ~~breaking down~~ the particle stream substantially

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horizontally and ~~distributing the particle stream~~ over a surface area of ~~the~~ said dilution treatment chamber ~~channel~~; and

at least one fluid flow aperture in ~~the~~ said dilution treatment chamber and below the distributor, positioned opposite side to the transfer aperture and adapted to create a substantially horizontal fluid flow jet between ~~the~~ said transfer chamber and ~~the~~ said dilution treatment chamber ~~channel~~ so as to project and entrain particles group with different masses from the passageway ~~channel~~ through and out of the particle stream toward said transfer aperture substantially horizontally aligned relatively to each other and located substantially opposed to each other relatively to said passageway, in order to collect the separated particles groups of particle stream in said transfer chamber and exiting by said transfer chamber outlet, which is the second-particle-group outlet to the transfer chamber with a first particle group remaining in ~~the~~ said ~~channel~~ passageway of said dilution treatment chamber for exiting through dilution treatment chamber and said passageway outlet, the first-particle-group, said fluid flow aperture ~~the apparatus~~ being adapted to be connected to a nozzle which is connected to a positive pressure source to create the pressure of the fluid flow, is momentum and magnitude, said fluid flow decelerate in said transfer chamber at a distance related to the surface area dimension of the nozzle outlet opening. In fact the deceleration is set in the transfer chamber which dimension is related for setting the particles which lost their momentum.

2. (Currently amended) The apparatus according to claim 1, further comprising a pre-treatment module located substantially above said particle inlet of the dilution treatment chamber, to guide the particle stream and to begin ~~cause~~ a horizontal dilution of the particle stream.

3. (Currently amended) The apparatus according to claim 2, wherein the pre-treatment module has at least one slide portion sloping downwardly toward ~~the~~ said particle inlet of the dilution treatment chamber for guiding and accelerating ~~a~~ the particle stream ~~to the~~ toward said dilution treatment chamber, and a deflecting surface located

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between the slide and ~~the~~ said particle inlet for breaking down the particle stream and for imparting the ~~horizontal~~ dilution to the particle stream.

4. (Currently amended) The apparatus according to claim 1, wherein at least one of ~~the~~ said dilution treatment chamber fluid flow apertures is used to inject a fluid additive into the particle stream ~~first particle group~~.

5.(Currently amended) The apparatus according to claim 1, wherein said dilution treatment chamber and said transfer casing share a wall separating said passageway and said transfer chamber from each other, said wall being substantially horizontally movable so as to allow variations in an horizontal cross-sectional area of said passageway and said dilution treatment chamber ~~at least one second particle group outlet and at the least one fluid flow aperture are horizontally aligned and on opposite sides of the channel of the dilution treatment chamber~~.

6. (Currently amended) The apparatus according to claim 5, wherein said fluid flow aperture in said dilution treatment chamber is defined by at least one nozzle provided for projecting a fluid, said nozzle including an adjustable gate selectively movable across said fluid flow aperture for controlling a rate and pressure of the fluid jet projected from said fluid flow aperture from said nozzle is adapted to be connected to the positive pressure source ~~is~~ and connected to ~~the~~ said dilution treatment chamber fluid flow aperture so as to allow to project and inject fluid in the passageway ~~channel~~ to create the fluid flow jet between the passageway ~~channel~~ and the transfer chamber.

7. (Currently amended) The apparatus according to claim 1, wherein ~~the~~ said nozzle distributor has an aperture laterally positioned in the passageway ~~channel~~, and a fluid-injection nozzle adapted to be connected to the positive pressure source and connected to the dilution treatment chamber aperture for projecting and injecting fluid in ~~the~~ said passageway ~~channel~~ of the dilution treatment chamber, for ~~breaking down~~ distributing the particle stream over a surface area and within the volume of ~~the~~ said dilution treatment chamber ~~channel~~.

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8. (Currently amended) The apparatus according to claim 1, wherein ~~the~~ said nozzle distributor is either an impeller, an ultrasound system, or a reciprocating strainer.

9. (Currently amended) The apparatus according to claim 1, further comprising a recuperation tray, positioned out of ~~the~~ said passageway ~~channel~~ in the transfer chamber and below the transfer aperture said recuperation tray share the wall between the dilution treatment chamber and the transfer chamber, ~~second particle group outlet for~~ said recuperation tray collecting particles of the first particle group deflected or forced out of the passageway ~~channel~~ by the flow of fluid, and for returning particle, in the remainder of the particle stream in said passageway. ~~the particles of the first particle group to a first particle group.~~

10. (Currently amended) The apparatus according to claim 1, wherein ~~the~~ said transfer chamber casing has an outlet at a bottom end thereof, for collecting the particle group received in ~~the~~ said transfer chamber casing.

11. (Currently amended) The apparatus according to claim 1, wherein ~~the~~ said transfer chamber of the transfer casing is segmented into laterally adjacent upstanding receptacles to further separate the second particle group according to the distance over which the particles of the second particle group are projected and entrained by the flow of fluid jet momentum.

12. (Currently amended) A method for separating a particle stream into particle groups, comprising the steps of:

i) vertically diluting the particle stream by directing the particle stream ~~to~~ at a predetermined falling condition and velocity creating more space between particles within a passageway of the dilution treatment chamber ~~channel~~;

ii) distributing ~~breaking down~~ the particle stream by subjecting the particle stream to lateral high pressure fluid flow, said pressure of the fluid creating a jet shape and momentum force of the fluid flow which increase the kinetic energy of the flowing fluid, resulting in the expense of its pressure energy and the jet momentum which decelerate in short distance related to the magnitude of fluid flow force and the surface

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area dimension of the nozzle outlet opening. This fluid flow jet momentum creates a lateral forces so as to distribute the particle stream over a surface area and within the volume of ~~the~~ said dilution treatment chamber ~~channel~~;

iii) projecting and entraining a particle group away from a remainder of the particle stream by creating a fluid flow force of predetermined magnitude across the particle stream in said falling condition, said fluid flow continuously impact the particles stream which particles absorbs in part the momentum of fluid flow pressure to move a group of particle on a longer distance of the width dimension of the dilution treatment chamber, and out of said dilution treatment chamber to said transfer chamber; and

iv) collecting the particle group and the remainder of the particle stream at separate locations.

14. (Currently amended) The method according to claim 12, wherein step ii) includes projecting and injecting a fluid flow into the particle stream to ~~break down said mass and~~ distribute the particle stream over the surface area and within the volume of ~~the~~ said dilution treatment chamber ~~channel~~.

15. (Currently amended) The method according to claim 12, wherein step iv) includes collecting the particle group into at least two particle subgroups by providing at least two collecting locations: one for the separated particle groups, and one for the remaining particle stream in the passageway ~~for the particle group~~, so as to collect particles in the subgroups according to the predetermined pressure, the predetermined pressure influencing the quantity and travelling distance ~~a~~ of entrainment and projection of the particles also in relation with their masses.

16. (Currently amended) An apparatus according to claims 1, for at least ~~one of mixing and~~ treating particle and/or fluid streams, comprising:

a dilution treatment chamber defining an upstanding generally parallelepipedic passageway ~~channel~~ having an inlet at a top end, and an outlet, ~~the~~ said passageway ~~channel~~ being adapted to receive said particle and/or fluid streams at the inlet such that said particle and/or fluid streams fall toward the outlet;

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at least one fluid flow aperture in the dilution treatment chamber, adapted to create a generally lateral flow of at least one of a fluid and particle jet within the passageway ~~channel~~ to create a turbulence by the jet force magnitude, impacting the particle stream in said passageway ~~the channel~~ for ~~at least one of mixing said particle and/or fluid streams and~~ treating said particle and/or fluid streams, whereby a ~~mixture and/or~~ treated matter will exit the passageway ~~channel~~ at the outlet; and;

a positive pressure source connected to the nozzle inlet and a nozzle outlet connected to the fluid flow aperture to create the lateral flow ~~of the~~ at predetermined pressure and magnitude of at least one of the fluid and the particle jet.

17. (Currently amended) The apparatus according to claim 16, further comprising a ~~particle~~ pre-treatment module at the inlet of the dilution treatment chamber, to cause a ~~horizontal~~ dilution of said particle and/or ~~agent~~ fluid streams.

18. (Currently amended) The apparatus according to claim 17, wherein ~~the said particle~~ pre-treatment module has at least one slide portion sloping downwardly toward the inlet of the dilution treatment chamber for guiding said particle and/or fluid streams to ~~the~~ said dilution treatment chamber, and a deflector surface between ~~the said~~ slide and ~~the said~~ inlet for breaking down said particle and/or fluid streams and for imparting the dilution to said particle and/or fluid streams.

19. (Currently amended) The apparatus according to claim 16, wherein a nozzle, interconnects the pressure source to the fluid flow aperture so as to create the flow of fluid in the passageway ~~channel~~ of the dilution treatment chamber.

20. (Currently amended) A method according to claims 12 for ~~at least one of~~ treating ~~and mixing~~ particle and/or fluids streams, comprising the steps of:

i) vertically accelerating speed of particles and/or fluid stream due to gravity force for diluting particle and/or fluid streams so as to cause more and more space between the particles and/or fluid by directing particle and/or fluid streams to a falling condition;

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